end of his interesting paper, gives a list of the seventeen or eighteen species which are known to him, or which are recorded as possessing this power. It is extremely probable that the more the subject is investigated, the more commonly will it be found to exist. J. P. E.

RESULTS OF SANITARY IMPROVEMENT IN CALCUTTA

WHEN a great public work is being done, it is a duty to call attention to it. In March 1862, Prof. Longmore, of Netley, who had acted as Sanitary Officer during the Mutiny at Calcutta, gave the following evidence before the Royal Commission on the sanitary state of the Indian Army:—"As regards the chief part of this extensive city (Calcutta)—that inhabited by the native population—the pestilential condition of the surface-drains and yards, and many of the tanks among the huts and houses, would not be credited by any one who had not been among them." In the "Report on Sanitary Improvements in India up to June 1871," recently printed by the India Office, is given a table showing that the cholera mortality in Calcutta had, for twenty years preceding 1861, averaged nearly 5,000 deaths per annum. In 1860 the cholera deaths were 6,553, and in 1866 they were 6,823. About this latter date works of drainage and water supply were commenced and have been gradually extended. Water is taken from the Hooghly and thoroughly filtered—it is then conveyed in pipes 12¾ miles in length to a reservoir in Calcutta and thence distributed. The whole population had this benefit conferred on them in the beginning of 1870, from which date the use of foul tank and river water was discontinued.

The drainage works are as yet confined to the southern districts, the sewage from which is conveyed to an outfall at the Salt Lake, and will be passed over a square mile of reclaimed land there, for irrigation of crops. The mortality from cholera in 1870 was 1,563, and the general mortality has fallen year by year with the extension of the works. Last year (1870) the death-rate was 23·4 per 1,000, considerably less than half what it was in 1865.

At a Social Science meeting held in Calcutta last March, a native physician, Dr. Chuckerbutty, gave his experience of the sanitary results as follows:—"I am in the habit of visiting, in the pursuit of my profession, the houses of the rich, as well as of the poor, in both divisions of the town, and I frankly confess that in the southern division, wherever the drainage works have been brought into play, the dwellings even of the humblest cottagers are in an infinitely better sanitary state than the mansions of the richest millionaires in the northern division where the drainage operations have not been extended. Before the completion of the water-works and the partial operation of the new drainage works, the mortality in Calcutta from dysentery, cholera, and fever, was most appalling. In 1865 dysentery was so common and fatal that sloughing cases of it were of daily occurrence. Such cases are now rarely to be seen. My annual share of cases of cholera in the Medical College Hospital before the completion of the new water-works was about 700, and I declare to you that, during the last eight months, I have scarcely had a dozen cases of that disease. Fever, too, has decreased during the same period in a like manner." The actual deaths from cholera in April, May, and June, of the present year were 85, 29, and 26, respectively.

After such results as these, we need not feel surprised that the Justices of Calcutta, a large proportion of whom are enlightened native gentlemen, decided unanimously last August to extend the drainage works all over the city, notwithstanding the opposition on purely theoretical grounds of certain British medical officers who ought to have known better, to the use of ordinary house drainage for Indian houses.

The opinion of the Army Sanitary Commission on this subject is quoted as follows in the India Office report:—"The municipal authorities of Calcutta and their officers have set an example of enlightened administration and effective expenditure to other Indian municipalities, which it is hoped will be followed. There are indeed few cities anywhere which can show so much good work done in so short a time and with such promising results for the future."

The laws of nature are the same everywhere. Calcutta has in times past suffered as London used to do from fatal fevers and bowel diseases, and there is now every prospect that a few years of active work will remove this stigma from the capital of the East, as it has been removed from the metropolis of the British Empire.

NOTES

THE following telegrams respecting the Total Eclipse of Dec. 12 have been received since our last:—"From the Governor of Ceylon to the Earl of Kimberley, dated, Colombo, Dec. 12, 10.45 A.M.:—'A telegram from Jaffna states that splendid weather prevailed during the eclipse. Most satisfactory and interesting observations have been made.'" "Mangalore, Dec. 16.—The eclipse observations have been very successful. The extension of the corona above hydrogen apparently small. Five admirable photographs have been taken." From Mr. Davis, photographer to the English Eclipse Expedition, through Lord Lindsay:—"Mangalore, Baikul.—Five totality negatives; extensive corona; persistent rifts; slight external changes." The French Academy of Sciences has received from M. Janssen the following telegraphic despatch, dated Octacamund, December 12, 5h. 20m.:—"Spectre de la Couronne attestant matière plus loin qu'atmosphère du Soleil."

WE can hardly credit the report which has just reached us that the Treasury has, at the last moment, declined to sanction the expenditure of public money on the publication of the Eclipse Reports of 1860 and 1870. We understand the combined report is now nearly ready, and both Parliament and the nation are entitled to receive a statement of the manner in which the public money has been expended. There are innumerable cases which may be cited as precedents for the publication of similar documents by the Government; as, for example, the Survey of Sinai, and the annual Greenwich Reports of Observations. After the Government has so generously granted money for recent scientific observations, we can hardly believe that the spirit of parsimony will so far prevail at the last moment as to mar, in this manner, the services it has performed towards Science.

THE death is announced on October 10, in Nicaragua, of fever, of Dr. Berthold Seemann, one of our most enterprising travellers and naturalists. Born at Hanover in 1825, Dr. Seemann was, in 1846, appointed naturalist to H.M.S. *Herald*, in its survey of the Pacific, during which voyage he had the opportunity of exploring, more thoroughly than almost any other European, the Pacific countries of South America and the Isthmus of Panama. In the same vessel he subsequently visited the Arctic regions, and the "Narrative of the Voyage of H.M.S. *Herald*," by Sir John Richardson and Dr. Seemann, is an important contribution to the natural history of previously little-known regions, the portion contributed by the latter comprising an account of the flora of Western Eskimo-land, north-western Mexico, the Isthmus of Panama, and the island of Hong-Kong. In 1860 he was sent by the English Government to the Fiji Islands, then lately acquired, and on his return published two works, one containing a narrative of his mission, the other, under the title of "Flora Vitiensis," a history of the vegetable productions of the islands. Since 1864, he has been greatly interested in the mining capabilities and other resources of the various states of Central America, and has spent much of his time there in the interest of different trading communities, and in promoting the route across the Isthmus. Dr. Seemann is the author of several popular botanical works in German and English, and has been since its foundation, Editor of the *Journal of Botany, British and Foreign.*

PROF. SEDGWICK's appeal for subscriptions from members of the University of Cambridge, to enable him to purchase the valuable collection of fossils belonging to Mr. Leckenby, has resulted in the collection of the sum required, 800*l.* Arrangements have been made for the completion of the purchase, and it is expected that in a few weeks Mr. Leckenby's valuable collections will be deposited in the Cambridge Geological Museum. This prompt and liberal response to the touching appeal of the venerable Professor demonstrates the regard in which he is universally and deservedly held by the members of the University.

THE following is the result of the examination for the Natural Science Tripos at Cambridge:—First Class—Garrod, John's; Lydekker, Trinity; Lewis, Downing; Warrington, Caius. Second Class—W. Edmunds, John's; Fox, Peter's; Read, John's; Owen, Downing; Everard, Trinity; Maudslay, Trinity-hall; Brewer, John's; Buddon, John's; Wigan, Trinity; Blunt, John's. The following acquitted themselves so as to deserve ordinary degrees:—Burrows, Caius; Murphy, John's; Phelps, Sydney; Pittman, Corpus; Wakefield, Caius. In the second class Fox and Reed are bracketed, also Brewer, Buddon, and Wigan.

NEXT term, Mr. Ruskin, Slade Professor of the Fine Arts at Oxford, will deliver a course of lectures on "The Relation of Natural Science to Art."

THE Government is advertising the appointment, by open competition, of a clerk to the Curator of the Royal Gardens at Kew, and of a second assistant in the Herbarium. The salaries commence at 100*l.* and 60*l.* respectively, and the specified age is in one case from 20 to 30, and in the other from 18 to 30. The examinations will take place on January 16.

THE following lectures have already been delivered this winter at Manchester, as Science Lectures for the People:—The first on November 3 on "Yeast," by Prof. Huxley; November 10 "Coal Colours," by Prof. Roscoe; November 16, "The Origin of the English People," by Prof. A. S. Wilkins; November 24, "The Food of Plants," by Prof. Odling; December 1, "The Unconscious Action of the Brain," by Dr. Carpenter. These lectures are always well attended, but since they are all reported and printed at the low price of a penny each, they appeal to a much wider circle than most of a similar character. This is the third year of these Science Lectures. The lectures for this session and those of past years are published by John Heywood, Deansgate, Manchester.

THE *Pall Mall Gazette* states that the approaching 400th anniversary of the birth of Copernicus has revived a contest of long standing between Poland and Germany, each of which claims the great astronomer as a son. The Germans argue that he was a German because he was born in Thorn, which at the time of his birth was under German rule; to which the Poles reply that Thorn was then really a Polish town, having been separated from Poland only seven years before; that his father and mother were Poles; that when he studied at Padua he enrolled himself among the students of the Polish nationality; and that throughout his life he gave constant proofs of his attachment to Poland and her King. Poland has always honoured Copernicus as one of her greatest men. A statue of him was erected by national subscription many years ago at Warsaw, and there are two others at Cracow, besides which numerous Polish medals and books have been issued in celebration of his memory. The anniversary above mentioned will be celebrated on the 19th of February, 1873, and great preparations are already being made at Posen for the occasion. The "Society of the Friends of Learning" in the old Polish city held a meeting the other day, at which it was decided, on the motion of a Polish clergyman, Canon Polkowski, to offer a prize for the best life of Copernicus, comprising the results of the latest investigations on the subject, and to publish it in the Polish, French, and German languages.

WITH a view towards the completion of the collection of water colour paintings illustrating the history of that art, Mr. William Smith, Vice-President of the National Portrait Gallery Trustees, has allowed Mr. Redgrave, R.A., the Inspector-General for Art, to select from his choice and valuable collection as many rare specimens as, in Mr. Redgrave's judgment, would illustrate the *early period* of the art. The works selected by Mr. Redgrave have been presented by Mr. Smith to the nation.

IT has been arranged that the new machines for printing, composing, and distributing type, which have been recently perfected at the *Times* printing office, shall be completely exhibited in working at the London International Exhibition of 1872. The power of rapid production by these several means is probably threefold in advance of any existing modes of printing. The *Mail* newspaper will be printed three times a week, and if possible the daily supplement of the *Times.*

THE third part of Mr. W. H. Baily's "Figures of Characteristic British Fossils, with Descriptive Remarks," has just been published. Part 4, which will complete the first volume, is in progress; each part consists of ten beautifully-executed plates, and the text is interspersed with many woodcuts. These latter are chiefly of recent forms. The figures are for the most part original, and this little work most worthily fills up a blank in biological literature.

FROM the commencement of November till December 12, a period of six weeks, the temperature at London was below the average, with the break of only a single day. The tables forwarded weekly by Mr. Glaisher to the *Gardener's Chronicle* show the average depression during the whole of that period to have amounted to as much as 6°·5 F. below the mean of the last fifty years, the minimum being on December 8, when the thermometer fell to 18°·6, and the temperature of the twenty-four hours was 19°·3 below the mean. Throughout France the month of November was very severe, the mean temperature of the month having been lower only four times during the last century. According to statistics presented to the Academy of Sciences by M. Ch. Sainte-Claire Deville, the thermometer fell as low as – 11°·3 C. (11°·7 F.) at Montargis on December 3, while even at Marseilles the remarkably low temperature (for that latitude) of – 2°·5 C. (27°·5 F.) is recorded on November 23. During the present month the frost is stated to have been still more severe in France and Italy, where much snow has fallen at Rome; and the unusual depression appears to have extended to North America.

THE Smithsonian Report, 1869, contains an account of the eruption of the Volcano of Colima in June 1869, by Dr. Charles Sartorius. The height of the volcano is 11,745 feet, and it had remained in repose since the last eruption in 1818. On June 12, 1869, dense smoke issued from the crater, and violent detonations were heard. On the 13th smoke and stones were ejected from the crater, and a "glowing upheaval" of the surface was seen. It was visited on June 15, when it was found that an upheaval of some 114 feet by 754 feet had taken place, forming a flattened arch. The appearance was that of a wild mass of volcanic red-hot rocks heaped one upon another, and constantly in motion, not unlike freshly-burned lime when sprinkled with water. The rocks which rolled down were, on cooling, of a grey colour. A piece broken off rang like glass, and was vitreous and porous.

In the middle of the upheaved mass the movement was strongest; three large clefts and intense light were displayed, while engulphed stones, which were swallowed up in great masses, were followed by a noise as of violent wind, and by clouds of smoke sometimes blue, sometimes yellow. The temperature of the air in the vicinity was 126° F. The stones in the midst of the heaving mass seemed to be softened, though not melted, and no flow of lava took place. This upheaval had taken place on a small, flat plain upon the north-east side of the mountain, it ascended to the scarp of the cone, and stretched in the direction of the snow peak, which was some 2¾ miles distant. On reaching this summit the temperature was found to be 41° F. From here the whole of the new upheaval could be surveyed. In the middle of it the most vehement movement was in progress, attended by the constant upheaving and descent of rocky masses, fire, and blue and yellow columns of smoke. The upper ancient crater has a diameter of 492 feet, and from it arose dense sulphurous vapour. Later explorers found a fissure from the new upheaval to the upper peak, 1—3 feet wide and about 3 feet in depth, but neither heat nor vapour issuing from it. Such volumes of fetid gases issued from the fissure that the inhabitants of the district were forced to leave their abodes. Cows and sheep were killed by it, so that it was found necessary to drive away the herds from the neighbourhood of the volcano.

Prof. Verrill has lately given, in the *American Journal of Science*, an account of the researches in marine zoology prosecuted by him during the past summer at Wood's Hole, Massachusetts, in connection with investigations of Prof. Baird respecting the food fishes of the coast of the United States; and in this he calls the attention of zoologists to some of the more important features of these examinations, promising a fuller account hereafter. One of these results consisted in ascertaining that, while the shores and shallow waters of the bays and sounds, as far as Cape Cod, are occupied chiefly by southern forms belonging to the Virginian fauna, the deeper channels and central parts of Long Island Sound, as far as Stonington, Connecticut, are inhabited almost exclusively by northern forms, or an extension of the Acadian fauna. Both the temperature observations at the surface and the deep-sea dredgings prove that there must be an offshoot of the arctic current settling into the middle of Vineyard Sound. Quite a number of interesting ascidians, both simple and compound, were met with by Prof. Verrill, several of them entirely new to science. Several new sponges were collected, and also a large number of crustaceans and molluscs previously unrecorded in that region. We would refer our readers to Prof. Verrill's article in the November number of the *American Journal of Science* for these interesting facts.

Harper's Weekly furnishes the following additional information of the great exploring expedition upon which Prof. Agassiz has been expecting to engage during the voyage of the Coast Survey steamer *Hassler*, from Boston to San Francisco, by way of the Straits of Magellan. The expedition was originally to start as early as July or August, and in that event the exploration in question would have commenced off the coast of the United States. Owing, however, to unexpected delays, the vessel has but recently fitted out and reported at Boston, where she has been detained, undergoing alterations of her machinery. We have already noticed the general plan and objects of the expedition. The scientific corps, as will be remembered, consists of Prof. and Mrs. Agassiz, Count Pourtales, ex-President Hill, of Cambridge, Dr. White, Mr. James Blake, and Dr. Steindachner, each gentleman having special charge of a particular department of the work, and interested in its successful accomplishment. The vessel itself is under the command of Captain P. C. Johnson, with Messrs. Kennedy and Day as lieutenants. Owing to the lateness of the season, the original plan of making extended explorations in the West Indies and off the eastern coast of South America has necessarily been modified, and the vessel will probably proceed almost directly to the Falkland Islands and the Straits of Magellan, there to commence the comprehensive investigations proposed, as otherwise a sufficient share of the summer season of the Straits could not be secured. The Atlantic Ocean work thus given up will, in all probability, partly at least, be performed by the *A. D. Bache*, a consort of the *Hassler*, next year.

The American Museum of Natural History, established at Central Park, New York, has, we learn from *Harper's Weekly*, had a most liberal offer made to it. The collection of shells of Dr. John C. Jay, formerly of New York, but now of Rye, is well known as one of the largest in the world; indeed, some years ago it was decidedly the finest in the United States; and although, with the lapse of years, the doctor has been less energetic in keeping it up to the present date, yet it forms a cabinet of magnificent extent, embracing, it is said, 14,000 species, 20,000 varieties, and 50,000 specimens, and costing many years of labour, and over 25,000 dols. in money. In addition to this, there is a library of 850 bound volumes, almost approaching completeness in its extent upon the subject of conchology. This has cost the doctor 10,000 dols., many of the works having been purchased at a time, too, when they were cheaper than at present. The doctor now offers to sell this library to the Museum of Natural History for the sum of 10,000 dols., and with it to present the entire collection of shells just referred to, so that the whole may go together, and form a complete section of the museum.

Advices from Portland, Oregon, under date of November 17, announce the arrival of Prof. O. C. Marsh, with his party of Yale College students, from an extended geological and palæontological exploration in the Blue Mountains and the John Day Valley. As might have been anticipated from the previous discoveries of the Rev. Thomas Condon, of Portland, in the same region, under much less favourable auspices, very extensive collections of fossil animals were made, which, when placed, as intended, in the museum of Yale College with those previously gathered by Prof. Marsh, will make a series of the extinct vertebrates of North America unequalled in any other cabinet.

At the meeting of the Norfolk and Norwich Naturalists' Society, held Nov. 18, Mr. Barrett read some further notes on the coast insects found at Brandon, which he considered confirmatory of the opinion expressed by him in a former paper, that these species have occupied this district, now far inland, from the time when it was part of the sea-coast. Amongst other coast species mentioned by Mr. Barrett was *Agrostis Tritici*, and of this species he remarked that, although it occurs sparingly on inland heaths, all the specimens are of a dull brown colour, whilst those found on the sea-coast are generally distinctly marked and richly coloured; all those taken by him at Brandon had precisely the deep style of colour and markings which characterise it on the sea-coast. *Agrostis cursoria*, although very abundant on the sea-coast, is not to be found at Brandon; and this Mr. Barrett considers a very strong proof that the other strictly littoral species enumerated have not reached their present situation by migrating across the intervening land from the present sea-coast. This species he thinks it not improbable was an immigrant from the eastward at a comparatively recent date, and that it has attained its greatest abundance on the spot where it first obtained a footing. It would not, therefore, have been an inhabitant of this portion of the post-glacial coast.

An earthquake shock was felt in New Jersey, Delaware, and Pennsylvania in the United States, on October 9. At Delaware it was noticed at 9.40 A.M, and at Philadelphia at the same time.